UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

NMFS Tracking No.
2003/00506

September 4, 2003

Shannon Stewart
Bonneville Power Administration
Post Office. Box 3632
Portland, Oregon 97208-3621

Re: Biological Opinion and Essential Fish Habitat Consultation for Big Creek Barrier Removal and Reconstruction Project, Kittitas County, Washington, WRIA 39

Dear Ms. Stewart:

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended, 16 U.S.C. 1536, and the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996, 16 U.S.C. 1855, the attached document transmits NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) and MSA consultation on the proposed Big Creek Barrier Removal and Reconstruction Project, Kittitas County, Washington.

The Bonneville Power Administration (BPA) has determined that the proposed action was likely to adversely affect the Middle Columbia River steelhead (*Oncorhynchus mykiss*) Evolutionarily Significant Unit. Formal consultation was initiated on May 6, 2003.

This Opinion reflects formal consultation and an analysis of effects covering listed steelhead in Big Creek, Washington. The Opinion is based on information provided in the biological evaluation received by NOAA on May 2, 2003, and subsequent information transmitted by telephone conversations, and mail. A complete administrative record of this consultation is on file at the Washington State Habitat Branch Office.

NOAA Fisheries concludes that the implementation of the proposed project is not likely to jeopardize the continued existence of Middle Columbia River steelhead. Please note that the incidental take statement, which includes reasonable and prudent measures and terms and conditions, was designed to minimize take.

The MSA consultation concluded that the proposed project may adversely impact designated Essential Fish Habitat (EFH) for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon. Specific Reasonable and Prudent Measures of the ESA consultation, and terms and conditions identified therein, would address the negative effects resulting from the proposed BPA actions. Therefore, NOAA Fisheries recommends that they be adopted as EFH conservation measures.

If you have any questions, please contact Dennis Carlson of the Washington State Habitat Branch Office at (360) 753-5828 or email at dennis.j.carlson@NOAA.gov.

Sincerely,

For Michael R Course

D. Robert Lohn
Regional Administrator

Enclosure

Endangered Species Act - Section 7 Consultation
Biological Opinion
and
Magnuson-Stevens Fishery Conservation
and Management Act
Essential Fish Habitat Consultation

Big Creek Barrier Removal and Reconstruction
Kittitas County, Washington

NMFS Tracking No.: 2003/00506

Agency: Bonneville Power Administration

Consultation
Conducted By: National Marine Fisheries Service

Issued by: for Michael R Crouse Date Issued: September 4, 2003

D. Robert Lohn
Regional Administrator

TABLE OF CONTENTS

1.0 INTRODUCTION

This document transmits NOAA's National Marine Fisheries Service (NOAA Fisheries) Biological Opinion (Opinion) under the Endangered Species Act (ESA), and Essential Fish Habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). It is based on our review of a proposal by the Bonneville Power Administration (BPA) to fund a project to install fish passage and fish screen structures on Big Creek in Kittitas County, Washington. Big Creek is a tributary to the Yakima River, which is in turn a tributary to the Columbia River. Big Creek is in the geographic range of the Middle Columbia River (MCR) Evolutionarily Significant Unit (ESU) for threatened steelhead (*Oncorhynchus mykiss*), and is EFH for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon. An ESU is considered a distinct population segment appropriate for protection under the ESA.

1.1 Background Information and Consultation History

The Washington State Department of Fish and Wildlife (WDFW) presented a Biological Evaluation (BE) to NOAA Fisheries on May 2, 2003, describing a project designed to restore anadromous fish access to spawning and juvenile rearing habitat in the Big Creek watershed in Kittitas County, Washington. The WDFW is the designated non-Federal representative of the BPA, which is providing funding for the proposal. Big Creek is located south of Interstate 90, between the towns of Cle Elum and Easton.

Water has been diverted from Big Creek through unscreened ditches for irrigation since the late 1880's. The current concrete dam was constructed in 1976 and included a fishway. A flood in 1977 undermined the dam and destroyed the fishway. The dam was repaired in 1978, but the fishway has remained inoperable since that time. The proposed project will provide fish passage over the concrete dam by constructing a series of nine passable weirs, four made of concrete and five made of rock. The project design allows for the dissipation of high energy flows between weirs, while establishing a fish passable gradient drop.

Until recently, the water users diverted essentially all of the stream flow during the summer and fall irrigation season, resulting in a dry stream channel in some years, with isolated pools of water from the dam downstream to the confluence with the Yakima River. Water right purchases by the Trendwest Corporation has returned 1.5 cubic feet per second (cfs) instream flow to the creek. Clarification of water rights through the state adjudication process has also resulted in additional instream flow, improving instream flows in lower Big Creek.

Restoring fish passage into tributary streams is an integral part of restoring Yakima River Basin fish runs. The restoration of fish passage and correction of screening deficiencies in Big Creek were identified as an element in the BPA Salmon and Steelhead Production Plan (Yakima River Basin Supplement I, 1990). The plan also notes installation of juvenile and adult passage facilities should be made pursuant to the Columbia River Basin Fish and Wildlife Program, in

which BPA proposes to implement needed fish passage improvements at irrigation diversion dams, canals, and ditches in the sub-basin.

Information for this document came from the BE, project plans attached to the WDFW Hydraulic Project Approval, and telephone conversations with William Myer of WDFW in Ellensburg, Washington.

1.2 Description of the Proposed Action

The proposed project will be constructed in the summer and fall of 2003, as follows. A temporary stream bypass will be constructed using ecology blocks, plastic, and sandbags to divert the stream into a 48-inch pipe around the west side of the construction site. Any fish stranded during the channel dewatering process will be netted and immediately released downstream from the construction site. Any water flowing through the hyporheic zone of the stream into the work site will be pumped to an upland site to filter it of sediment, prior to returning to the lower reach of the stream. Initial work site preparation will require heavy equipment crossing the stream to install a temporary bypass, but thereafter equipment shall be limited to the dewatered zone of the stream channel or work from the bank.

1.2.1 Concrete Weir Construction

Excavation and site preparation for the construction of the concrete weirs will begin once the work area is dewatered. This process will entail creating four weirs by pumping concrete into forms, each weir requiring about 20 cubic yards (cy) of material. No concrete slurry or contaminated water will be allowed to escape from the construction area. Contaminated water from the work area will be pumped to an upland site where it cannot return to the stream.

1.2.2 Rock Weir Construction

Five rock weirs will be constructed using approximately 500 cy of large, angular rock and roughened channel mix. The weirs will be keyed into both banks, likely resulting in disturbance and/or loss of riparian vegetation adjacent to the immediate work area. The BPA will minimize removal of trees and shrubs, and disturbance to soils in the riparian areas.

1.2.3 Installation of Fish Screens

New fish screen facilities that meet all WDFW and NMFS screen criteria will be installed on the Lund and Darling irrigation diversions. The new screens will enable each diverter to withdraw their water right (up to 6.0 and 2.0 cfs, respectively). It should be noted the open diversion ditches will be converted at a later time to enclosed pipelines to improve efficiency of transmission and water use. The conversion of open ditches to enclosed pipelines will be independently funded and constructed through the Kittitas County Conservation District, and are not a part of this proposed action. A fish passage roughened channel will be constructed within Big Creek just below the two points of diversion. The roughened channel will entail pouring

four in-place concrete weirs and five rock weirs. These structures will be constructed to span the width of the creek, and will allow unimpeded movement of migrating fish while providing the diversions adequate flow.

1.2.4 Re-watering the Stream

Stream flow will be slowly redirected into its original channel from the bypass structure to minimize the possibility of introducing a pulse of sediment created by the construction project. Ecology blocks and sandbags used to construct the bypass will be incrementally removed until the stream is completely returned to its channel. The bypass reach will be inspected to ensure that any fish found will be safely collected and released upstream from the project site.

1.2.5 Project Monitoring, Maintenance, and Evaluation

Project monitoring, maintenance, and evaluation will be conducted once yearly, beginning in 2003 and extending through 2007. Initial project inspection and monitoring will be conducted by WDFW for the first year. Day-to-day operation and maintenance of the facility will be conducted by the Big Creek Water Users. The long-term success of the project will be monitored by Yakama Nation Fisheries Program technicians, who will conduct redd surveys and fish counts upstream of the weirs.

The WDFW has proposed the following conservation measures or Best Management Practices (BMPs) to minimize the impacts of the proposed project to listed salmonids.

- Pre-construction fish surveys will be conducted by fish biologists snorkeling the project site for a distance of 1,000 feet both upstream and downstream from the work area.

- Construction equipment will be maintained in good working order, with no fluid leaks. All heavy construction equipment will be inspected daily to ensure there are no fluid leaks. All refueling, equipment storage, equipment maintenance, and staging, etc., will be conducted at least 150 feet from any stream, water body, or wetland.

- Stream channel dewatering will be gradual to allow for the rescue of stranded fish. Hand-held nets and seines will be used to collect any stranded fish. Any fish collected will be immediately transferred to buckets and released back to the creek outside the project area. Any adult fish stranded will be captured and immediately transferred to a "rubber sleeve" for safe transport to a release site outside of the work area. Other aquatic organisms, such as crayfish, lamprey, or shellfish will be collected in buckets and moved outside of the construction site. Block nets or a barrier will be installed on the stream to prevent fish from re-entering the construction area. All fish collection, transport, and release will be conducted by qualified fish biologists.

- A temporary stream bypass will isolate the work site when concrete is poured. The cement will cure fully prior to re-watering the stream channel. Pumps will be available to remove

any hyporehic flow or seepage into or below the construction area that becomes silted or comes into contact with uncured cement.

1.3 Description of the Action Area

Under the ESA, the "Action Area" is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this consultation, the Action Area includes Big Creek a quarter of a mile downstream from the existing passage structure, and extends approximately 50 feet upstream from the structure. The Action Area also includes the adjacent riparian zone within the construction area and all areas affected by the project including any staging areas and roadways.

2.0 ENDANGERED SPECIES ACT BIOLOGICAL OPINION

The objective of this consultation is to ensure that the agency's proposed action is not likely to jeopardize the continued existence of the MCR steelhead ESU. The MCR ESU is a distinct population segment of steelhead salmon, the preservation of which is necessary to maintain genetic diversity of steelhead.

2.1. Evaluating Proposed Actions

The standards for determining jeopardy as set forth in section 7(a)(2) of the ESA are defined in 50 CFR part 402 (the consultation regulations). This analysis involves the initial steps of (1) defining the biological requirements of the listed species, and (2) evaluating the relevance of the environmental baseline to the species' current status.

From that, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries considers estimated level of mortality attributed to: (1) collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmonid's life stages that occur beyond the Action Area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives for the action.

2.1.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements, and identify those that are most relevant to each consultation.

The biological requirements are those conditions necessary for listed species to survive and recover to naturally reproducing population levels, at which time protection under the ESA

would be unnecessary. Species or ESUs not requiring ESA protection have the following attributes: population sizes large enough to maintain genetic diversity and heterogeneity; the ability to adapt to and survive environmental variation; and the ability to be self-sustaining in the natural environment.

The biological requirements of MCR steelhead include adequate food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence *et al.* 1996). The specific biological requirements affected by the proposed action include water quality, food, and unimpeded migratory access.

2.1.2 Environmental Baseline

The environmental baseline represents the current set of conditions to which the effects of the proposed action would be added. The term "environmental baseline" means "the past and present impacts of all Federal, state, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process" (50 CFR 402.02).

Big Creek is 12.7 miles in length and is a tributary to the Yakima River. The Big Creek basin drains approximately 15,825 acres. The first 2.5 miles upstream from the Yakima River are on private land outside the Wenatchee National Forest boundary. The remainder of Big Creek is on Forest Service and Plum Creek Timber Company land in a checkerboard ownership pattern.

Big Creek is known to have produced steelhead historically, and presumably produced significant numbers of coho and spring chinook salmon, and possibly bull trout. The primary factors limiting anadromous fish production in Big Creek are the impassable dam and its associated unscreened diversions, in addition to artificially low stream flows below the dam.

Flows in Big Creek above the diversions range from low summer flows averaging 3 to15 cfs, to over 300 cfs during spring runoff. Water temperatures upstream of the diversions are excellent for salmonid rearing. The highest temperatures recorded upstream of the diversion dam during the summer of 1989 were 60 to 63 degrees Fahrenheit.

Above river mile (RM) 3.0, Big Creek flows through a low gradient (one to three percent), steep-walled canyon for about five miles to RM 8.0. In the canyon reach, Big Creek contains excellent rearing habitat for salmonids. Riparian cover is excellent; stream banks are stable, and in-stream habitat is diverse. Spawning gravel is abundant below RM 3.5 and abundant pocket spawning opportunity is present in the remainder of this reach. Above RM 8.0 to RM 11.1, the creek's width is reduced, but is suitable for salmonid production. Spawning gravel is abundant and instream habitat is good.

Most habitat indicators are functioning at risk or not properly functioning in the Action Area. Agriculture, diversions, residences, and roads have reduced and fragmented riparian habitat, increased sedimentation, increased water temperature, reduced stream flow, and inhibited or prevented fish passage.

2.1.2.1 Factors Affecting the Species at the Population Scale

In previous Opinions, NOAA Fisheries assessed life history, habitat and hydrology, hatchery influence, and population trends in analyzing the effects of the underlying action on affected species at the population scale (see, for example, FCRPS, NMFS 2000). A thumbnail description of each of these factors for the MCR steelhead ESU is provided below.

2.1.2.1.1 Life History. Most fish in this ESU smolt at two years and spend one to two years in salt water before reentering freshwater, where they may remain up to a year before spawning (Howell et al. 1985). All steelhead upstream of The Dalles Dam are summer-run (Schreck et al. 1986, Reisenbichler et al. 1992, Chapman et al. 1994). The Klickitat River, however, produces both summer and winter steelhead, and age-2-ocean steelhead dominate the summer steelhead, whereas most other rivers in the region produce about equal numbers of both age-1- and 2-ocean fish. A non-anadromous form co-occurs with the anadromous form in this ESU; information suggests that the two forms may not be isolated reproductively, except where barriers are involved.

2.1.2.1.2 Habitat and Hydrology. The reasons for the decline of steelhead in the Yakima River watershed include:

- construction of four dams on the Columbia River downstream of the Yakima River;
- timber practices, degraded riparian and instream habitat from urbanization and livestock grazing;
- large irrigation withdrawals;
- poorly screened or unscreened irrigation diversions;
- low instream flows reducing rearing habitat and impeding fish passage; and
- high water temperatures.

These conditions are greatly magnified in the lower Yakima River system, creating unfavorable passage for upstream and downstream migrants as well as degraded rearing conditions for juveniles.

2.1.2.1.3 Hatchery Influence. Hatchery management practices are suspected to be a major factor in the decline of this ESU, but are probably less of a factor for the Yakima Basin

population. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation or introduction of deleterious (*i.e.*, non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples 1991; NOAA Fisheries 1996; 63 Fed. Reg. 11798, March 10, 1998). Hatchery steelhead have not been released into the Yakima River Basin since the early 1990's.

2.1.2.1.4 Population Trends and Risks. For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[1] ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al.* 2001). NOAA Fisheries has also estimated the risk of absolute extinction for four of the spawning aggregations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness equals zero), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Umatilla River and Deschutes River summer runs (McClure *et al.* 2001).

2.1.2.2 Factors Affecting the Species within the Action Area

Section 4(a)(1) of the ESA and NOAA Fisheries listing regulations (50 CFR 424) set forth procedures for listing species. The Secretary of Commerce must determine, through the regulatory process, if a species is endangered or threatened based upon any one, or a combination, of the following factors: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or human-made factors affecting its continued existence.

The proposed action includes activities that would have some level of effects with short-term impacts from category (1) in the above paragraph, and the potential for long-term impacts as described in category (5). The characterization of these effects and a conclusion relating the effects to the continued existence of MCR steelhead is provided in section 2.1.3.
The major factors affecting MCR steelhead within the Action Area include inadequate instream flows, inadequate passage, and riparian habitat.

2.1.3 Status of Species

NOAA Fisheries considers the current status of the listed species by taking into account population size, trends, distribution and genetic diversity. To assess the current status of the

[1]Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between spawning aggregations. Population trends are projected under the assumption that all conditions will stay the same into the future.

listed species, NOAA Fisheries starts with the determinations made in its original decision to list the species for protection under the ESA. In addition, the assessment will consider any new information or data that are relevant to the determination.

The listing status and biological information for NOAA Fisheries listed species that are the subject of this consultation are described below in Table 1.

Species (Biological Reference)	**Listing Status Reference**	**Critical Habitat Reference**
Steelhead from Washington, Idaho, Oregon and California, (Busby, *et al.* 1996).	The MCR ESU is listed as Threatened under the ESA by the NMFS, (64 Fed. Reg. 14517, March 25, 1999).	Not Designated[2]

Table 1. References to Federal Register Notices containing additional information concerning listing status, biological information, and Critical Habitat designations for listed and proposed species considered in this Opinion.

Middle Columbia River steelhead population sizes are substantially lower than historic levels, and at least two extinctions are known to have occurred in the ESU. In larger rivers (John Day, Deschutes, and Yakima), steelhead abundance has been severely reduced: it is estimated that the Yakima River had annual run sizes of 100,000 fish prior to the 1960's; more recently (early 1990's), natural escapement has been about 1,200 fish (WDF *et al.* 1993). Across the entire ESU, the wild fish escapement has averaged 39,000 and total escapement 142,000 (includes hatchery fish). The large proportion of hatchery fish, concurrent with the decline of wild fish, is a major risk to the MCR ESU (WDF *et al.* 1993; Busby *et al.* 1996; 63 Fed. Reg. 11798, March 10, 1998).

Within the Yakima River Basin, adult steelhead returns have averaged 1,256 fish (range 505 (1996) to 2,840 (1988)) over brood years 1985-2000 as monitored at Prosser Dam (RM 47.1; YSS 2001). Steelhead spawning varies across temporal and spatial scales in the Yakima Basin as well, although the current spatial distribution is significantly decreased from historic conditions. NOAA Fisheries has identified the following spawning populations within the Yakima Basin: upper Yakima River above Ellensburg, Teanaway River, Swauk Creek, Taneum Creek, Roza Canyon, mainstem Yakima River between the Naches River and Roza Dam, Little Naches River, Bumping River, Naches River, Rattlesnake Creek, Toppenish Creek, Marion Drain, and Satus Creek. Typically, steelhead spawn earlier at lower, warmer elevations than higher, colder waters.
Overall, most spawning is completed within the months of January through May (Hockersmith *et al.* 1995), although steelhead have been observed spawning in the Teanaway River (RM 176.1),

[2]Under development. On April 30, 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing a February 2000 Critical Habitat designation for this and 18 other ESUs.

a tributary to the Upper Yakima into July. These steelhead spawn later in the year at higher elevations in the Yakima basin, and face lethal conditions (in most years) as down-migrating kelts (spawned-out adults returning to the ocean) in the lower Yakima River. The MCR steelhead that spawn in the Yakima basin at lower elevations potentially meet the same fate, however, earlier spawn timing and emigration may provide increased survival because kelts traverse the lower Yakima River before water quality becomes lethal. High temperatures, low flows, and degraded water quality from irrigation effluents (*i.e.*, high temperature, turbidity and pollutant concentrations), contribute to extremely low survival during summer months (Vaccaro 1986; Lichatowich and Mobrand 1995; Lichatowich *et al.* 1995; Pearsons *et al.* 1996; Lilga 1998).

Four genetically distinct spawning populations of wild steelhead have been identified in the Yakima basin, one of which spawns in the upper Yakima River and its tributaries (Phelps *et al*. 2000). Hockersmith *et al.* (1995) found that 3% of radio-tagged steelhead from 1990 to 1992 utilized the upper mainstem Yakima River and its tributaries for spawning, beginning in early March and extending into late May. Busack *et al.* (1991) analyzed scale samples from smolts and adult steelhead and found, generally, that smoltification occurs after two years in the Yakima system, with a few fish maturing after three years and an even smaller proportion reaching the smolt stage after one year. This means that listed steelhead are in the Action Area during every day of the calendar year. Within the Yakima River basin, the Upper Yakima subpopulation of steelhead contributes to the run as a whole, both in terms of numbers and genetic diversity.

The upper Yakima steelhead population was undoubtedly adversely affected by operations at Roza Dam (RM 128) between 1941 and 1959. Although fitted with a ladder, the pool at Roza Dam was kept down from the end of one irrigation season (mid-October) to the beginning of the next (mid-March) for these 18 years. Hockersmith *et al.* (1995) found that steelhead passed Roza Dam from November through March, and more recent data suggest that passage occurs from the end of September through May. Consequently, operations at Roza Dam virtually eliminated fish passage for most of the steelhead migration season, and excluded most steelhead bound for the upper Yakima from reaching their destination. A new ladder was installed at Roza Dam in 1989 that allows better passage, but only when the pool is completely up or down. However, the ladder is inoperable at levels between maximum and minimum pool when the reservoir is manipulated to facilitate operational activities such as screen maintenance at the end of October and early November.

2.1.4 Relevance of Environmental Baseline to Species Current Status

The biological requirements of MCR steelhead are not being met under the baseline conditions, and this has contributed to the threatened status of the ESU. Middle Columbia River steelhead have been negatively affected by a combination of habitat alteration and hatchery management practices. The four downstream, mainstem dams on the Columbia are perhaps the most significant source of habitat degradation for this ESU. The dams act impede passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. In addition to dams, irrigation systems have had a

major negative impact by diverting large quantities of water, stranding fish, and acting as barriers to passage. Other major habitat degradation has occurred through urbanization and livestock grazing practices (WDF *et al.* 1993; Busby *et al.* 1996; NMFS 1996; 63 Fed. Reg. 11798, March 10, 1998).

Habitat alterations and differential availability impose an upper limit on the production of naturally spawning populations of salmon. The National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996). Some of the habitat impacts identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of streamflows and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat and large woody debris (NMFS 1998, NRCC 1996, Bishop and Morgan 1996).

Hatchery management practices are suspected to be a major factor in the decline of this ESU. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation or introduction of deleterious (non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples 1991; Hilborn 1992; NMFS 1996; 63 Fed. Reg. 11798, March 10, 1998).

2.2 Effects of the Proposed Action

Because MCR steelhead are present in the Action Area year round, they are likely to experience effects from the proposed action. The reach downstream from the existing fish passage barrier/diversion provides spawning and rearing habitat for steelhead. Redd surveys conducted by the Yakama Nation Fisheries Program have not identified any steelhead redds in lower Big Creek over the last 13 years. However, steelhead redds are difficult to detect during spring high flows and these redd surveys would not comprehensive. Steelhead have been documented spawning in the Yakima River local to Big Creek, and juvenile *O. mykiss* are seasonally common in lower Big Creek.

NOAA Fisheries' ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline" (50 CFR 402.02).

2.2.1 Direct Effects

Direct effects are the immediate effects of the project on the species or its habitat. Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not

included in the environmental baseline or treated as indirect effects) are not evaluated (USFWS and NMFS 1998).

2.2.1.1 Water Quality

The construction of concrete weirs, rock weirs, a temporary stream bypass, and the installation of fish screens on two diversions, will mobilize sediments and temporarily increase downstream turbidity levels. Around construction areas (within several hundred feet), the level of turbidity would likely exceed ambient levels by a substantial margin and potentially affect MCR steelhead within the entire Action Area. Three specific activities will mobilize sediments: the diversion of stream to a bypass pipe; the construction of concrete and rock weirs; and diversion of streamflow back into the channel. These activities will deliver short-term (hours to days) pulses of sediment downstream. However, the proposed action includes measures to decrease the likelihood and extent of any such effect on listed salmonids. These measures include timing restrictions and construction BMPs.

Quantifying turbidity levels, and their effect on fish species, is complicated by several factors. First, turbidity from an activity will typically decrease as distance from the activity increases. How quickly turbidity levels attenuate depends on the quantity of material in suspension (*e.g.*, mass or volume), particle size, the amount and velocity of ambient water (dilution factor), and the physical/chemical properties of the sediments. Second, the impact of turbidity on fish is not only related to the turbidity levels, but also the particle size of the suspended sediments.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (*i.e.*, gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al*. 1984; Berg and Northcote 1985; Servizi and Martens 1992). The magnitude of these stress responses are generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity (35-150 nephelometric turbidity units [NTUs]) accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect).

Increased turbidity will be short-lived and highly localized because of low flow conditions during the proposed work window. The project also includes measures to reduce or avoid turbidity impacts. Fish located within the construction area will be removed and, therefore, will not experience turbidity from the project. Fish downstream of the in-water construction activity, but within Action Area when the effects are manifest, are likely to be able to avoid the area until the turbid conditions dissipate. Finally, installation will occur when adult fish are least likely to be present near the project site, minimizing the number of fish that might be exposed to turbidity.

Potential for other water quality impacts also exist. As with all construction activities that require the use of heavy equipment, accidental release of fuel, oil, and other contaminants might occur. Those contaminants could injure or kill aquatic organisms if spilled into a water body or

the adjacent riparian zone. However, all equipment fueling and maintenance would occur in designated staging areas 50 feet or more from any water body or wetland, making it unlikely that a chemical spill would reach the stream.

2.2.1.2 Streambed and Bank Disturbance

Concrete and rock weir construction, and bypass pipe installation will disturb channel and bank substrates. Related construction work (site access and installing fish screens, *etc*.) will require riparian vegetation removal or other streambank disturbance. NOAA Fisheries expects the effects from these activities on MCR steelhead to be minor.

Project construction activities are limited in the time of the year they can occur. This limitation or "work window" is designed to reduce the exposure of vulnerable fish life stages to construction impacts. The window for this proposed action allows work when the only MCR steelhead life stages present in the Action Area should be free-swimming subyearling and yearling steelhead. These life stages are less vulnerable to construction effects as they are capable of evacuating the area when work disturbance is initiated. In addition, WDFW will be implementing numerous BMPs as outlined in the BE to minimize and reduce effects to listed salmonids.

2.2.1.3 Diversion of Stream and Removal of Fish

The temporary stream diversion will impede salmonid movement, and might cause stranding of sub-yearling and yearling steelhead. By gradually dewatering, fish are able to move with the receding water, the BPA will reduced the likelihood of these negative effects. Furthermore, stream diversion will be timed to avoid periods when fish are likely to be actively migrating.

In order to further reduce the chance that fish will be trapped by dewatering, a block net will be installed at the upstream terminus of the construction area, and a crew will then drag a seine through the entire construction area, beginning at the upstream block net. A second block net will then be installed at the downstream terminus of the construction area. If listed fish are stranded between the block nets, they will be removed by hand or with dip nets, placed in buckets, and safely released outside of the construction area.

2.2.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action. Indirect effects might include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. These actions must be reasonably certain to occur, or be a logical extension of the proposed action (50 CFR 402.02).

2.2.2.1 Macroinvertebrate Production

Project construction will require isolating some instream work from stream flow. Diverting water away from these worksites will cause the temporary loss (burial, dessication, and displacement) of macroinvertebrate habitat. Aquatic invertebrates provide an important source of prey for salmonids, and the loss of their habitat through burial, dessication, or displacement may reduce foraging opportunities for listed salmonids. This loss of foraging opportunity will be short-lived because the diversions will be temporary, and invertebrates tend to quickly recolonize disturbed areas (Allan 1995). In the Action Area, recolonization rates are expected to be rapid because affected areas are small and construction activities will be short-lived. Furthermore, macroinvertebrates such as crayfish, shellfish, or lampreys will be collected in buckets and released safely downstream of the construction area.

2.2.2.2 Riparian and Fisheries Habitat

The construction of concrete and rock weirs, and the installation of fish screens and a stream bypass system will cause a short-term loss of riparian function by removing or degrading vegetation. The loss of functions might include shading and organic matter inputs to the stream. Shade helps cool the shallow areas of the stream, providing temperatures beneficial to MCR steelhead. Organic input from riparian vegetation is the foundation for the prey-base of MCR steelhead. However, the loss of riparian function should be minimal because the footprint of the project is small, and few, if any, large trees will need to be removed. Large woody debris recruitment is not expected to be significantly reduced by the proposed project. The bank areas used to key the rock and concrete weirs will be revegetated with a diverse assemblage of species that are native to the project area or region to stabilize soils and help expedite site recovery. The negative effects of these activities on MCR steelhead and aquatic habitat indicators will be limited by implementing construction methods and approaches included in the project design, BMPs.

2.2.2.3 Fish Stranding

The long-term effect of this project is a likely increase in the number of steelhead spawning in Big Creek, though it is possible that improved passage conditions will expose more fish to future dewatering conditions in the lower segment of Big Creek (downstream of the Darling and Lund diversions). The potential for stranding is not expected to be a significant problem, because this project will provide access to high quality upstream habitat, and fish will be able to migrate further upstream as flows recede to avoid any dewatered stretches.

The potential for stream dewatering downstream from the Darling and Lund diversions will also diminish because of water right purchases to keep stream flow in Big Creek. There is also a future plan to help maintain instream flow in lower Big Creek by enclosing the Darling and Lund ditches in pipes to improve water conveyance and reduce transmission losses. This may contribute to improved instream flow.

2.2.3 Population Scale Effects

As detailed in section 2.1.2.1.4, NOAA Fisheries has estimated the median population growth rate (lambda) for MCR steelhead affected by the Big Creek barrier removal project. For the MCR ESU, life history diversity has been limited by the influence of hatchery fish, by physical barriers that prevent migration to historical spawning and/or rearing areas, and by water temperature barriers that influence the timing of emergence, juvenile growth rates, or the timing of upstream or downstream migration. In addition, hydropower development has profoundly altered the riverine environment and those habitats vital to the survival and recovery of the MCR ESU.

The construction of concrete and rock weirs and the stream bypass will result in effects on listed MCR steelhead, despite the fact that conservation measures and BMPs are expected to reduce the potential for harm to listed fish from increased turbidity, streambed and bank disturbance, and fish removal. These negative effects are short-term, and the long-term effect of the proposed action will be to improve fish passage characteristics at the diversion structure, creating permanent access to currently under- and unused habitat in and upstream of the Action Area. The balance of the project will be to provide potential increases in spawning and rearing for MCR steelhead.

2.3 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the Action Area of Federal action subject to consultation" (50 CFR 402.02). Future Federal actions that are unrelated to the proposed actions are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

In the Action Area for this project, agricultural activities are the main land use. Riparian buffers are not properly functioning, containing little woody vegetation. Although land use practices that would result in take of endangered species are prohibited by section 9 of the ESA, such actions do occur. NOAA Fisheries cannot conclude with certainty that any particular riparian habitat will be modified to such an extent that take will occur. Riparian habitat is essential to salmonids in providing and maintaining various stream characteristics such as channel stabilization and morphology, leaf litter, and shade. However, given the patterns of riparian development in the Action Area and rapid human population growth of Kittitas County, it is reasonably certain that some riparian habitat will be impacted in the future by non-Federal activities. Conversely, many of the agricultural landowners in the watershed are participating in cooperative, voluntary programs to improve riparian conditions of their lands.

Big Creek and other Yakima Basin tributaries are generally overappropriated. This condition is unlikely to worsen as the state of Washington continues to clarify water rights through the adjudication process. Furthermore, the state is engaged, through the Departments of Ecology and Fish and Wildlife, and the Kittitas County Conservation District Irrigation Efficiency Program, in programs to improve instream flows in places like Big Creek. If successful, such a program would obviate the potential for stranding in lower Big Creek.

2.4 Conclusion/Opinion

NOAA Fisheries has reviewed the direct, and indirect, effects of the proposed action on listed species and their habitat. NOAA Fisheries evaluated these effects in light of existing conditions in the Action Area, anticipated cumulative effects, and measures outside of the Action Area to improve or restore MCR habitat. While the proposed action is likely to cause short-term adverse effects on listed salmonids by modifying habitat during construction activities, these effects are unlikely to reduce salmonid distribution, reproduction, or numbers in any meaningful way. The long-term project effect is expected to increase salmonid numbers and distribution. Consequently, the proposed action is not likely to jeopardize the continued existence of listed MCR steelhead.

2.5 Reinitiation of Consultation

This concludes formal consultation for the Big Creek Fish Barrier Removal and Screening Project. Consultation must be reinitiated if: (1) the amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed (50 CFR 402.16). To reinitiate consultation, the BPA should contact the Habitat Conservation Division (Washington Branch Office) of NOAA Fisheries. Upon reinitiation, the protection provided by this incidental take statement, section 7(o)(2), becomes invalid.

For this consultation, if the BPA fails to implement any of the BMPs or conservation measures described as part of the project, or exceeds the described amount of habitat impact, the action will affect MCR steelhead in a way that is not considered in this Opinion, requiring reinitiation of consultation.

2.6 Incidental take Statement

The ESA at section 9 (16 U.S.C. 1538) prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by the section 4(d) rule (50 CFR 223.203). Take is defined by statute as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (16 U.S.C. 1532(19)). Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering" (50 CFR 222.102). Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR 17.3).

Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant" (50 CFR 402.02). The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement (16 U.S.C. 1536). The incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures (RPMs) that are necessary to minimize the effect of such take, and sets forth terms and conditions with which the action agency must comply in order for the exemption from the take prohibition to be valid.

2.6.1 Amount or Extent of Take Anticipated

As stated in section 2.1 above, juvenile MCR steelhead spawn and juveniles rear in the Action Area. Some MCR steelhead are likely to be present in the Action Area during project construction, thus they will likely encounter some of the effects of the proposed action, meaning incidental take of these listed fish is reasonably certain to occur. The proposed action includes measures to reduce the likelihood and amount of incidental take.

Take in the form of injury is likely to result during construction and the activities used to move fish during work site isolation. Take is in the form of harm is likely from the other habitat affecting activities. Because fish presence is highly variable numerically and temporally, NOAA Fisheries cannot estimate a specific amount of incidental take of listed fish from this Federal action, despite the use of the best scientific and commercial data available. In situations like this, NOAA Fisheries determines the amount of anticipated take to be "unquantifiable." As a surrogate for estimating the number of fish harmed by the proposed action, NOAA Fisheries has estimated the extent of habitat affected by those activities. The estimated extent of habitat affected from the construction activities (e.g., sediment mobilization, stream dewatering, and short-term loss of riparian habitat) are the thresholds for reinitiating consultation. Thus, exceeding these thresholds during the project would be modified in a way that causes an effect on listed species that was not previously considered, and require reinitiation.

For water quality effects, take is anticipated for turbidity increases within 100 feet downstream of the project area (for flows up to 10 cfs, expected monthly mean flow ranges between 3 cfs and 20 cfs for the August to December work window). Take is also anticipated for work site isolation and fish removal associated with the temporary diversion of up to 300 feet of Big Creek. Take is furthermore anticipated for the temporary disturbance of riparian vegetation not to exceed a 200-foot radius around the project site, and for the removal of not more than four mature trees. Finally, take is anticipated for that amount of benthic habitat that is necessarily disturbed to install up to four channel spanning concrete weirs and up to five channel spanning rock weirs.

2.6.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. The BPA has the continuing duty to regulate the activities covered in this incidental take statement. If the BPA or its applicant fails

implement the measures through adherence to the terms and conditions of the incidental take statement, or if the BPA fails to retain the oversight to ensure compliance with the terms and conditions, the protective coverage of section 7(o)(2) may lapse.

NOAA Fisheries believes that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the take of ESA-listed fish resulting from the proposed Federal action.

1. BPA will minimize incidental take from in-water construction activities.

2. BPA will minimize incidental take from changes in water quality.

3. BPA will minimize incidental take from effects on riparian and instream habitat.

2.6.3 Terms and Conditions

To comply with ESA section 7 and be exempt from the prohibitions of ESA section 9 the BPA and/or its applicant must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions largely reflect conservation measures described as part of the proposed action in the BA and analyzed in the foregoing Opinion. The NOAA Fisheries has included them here to ensure that the action agency is aware that they are non-discretionary.

To implement RPM No. 1 (in-water construction) above, the BPA shall ensure that:

1.1 All work within the active channel of Big Creek will be completed between August 1 and December 15, 2003.

1.2 All in-water work will be isolated by a cofferdam, or the stream shall be routed through a pipe or culvert, to minimize the potential for sediment entrainment. If a cofferdam is used, any fish trapped in the isolation pool will be removed prior to dewatering, using NOAA Fisheries approved methods.

1.2.1 If seining is possible, fish will be captured under the supervision of a fishery biologist experienced in such efforts and all staff working with the seining operation must have the necessary knowledge, skills, and abilities to ensure safe handling of all ESA-listed fish.

1.2.2 ESA-listed fish must be handled with extreme care and kept in water to the maximum extent possible during capture and transfer procedures. The transfer of ESA-listed fish must be conducted using a sanctuary net that holds water during transfer, whenever necessary to prevent the added stress of an out-of-water transfer.

1.2.3 ESA-listed fish will not be marked or anaesthetized.

1.2.4 Captured fish must be released in appropriate habitat, as near as possible to the capture site.

1.3 Alteration or disturbance of streambanks will be minimized.

To implement RPM No. 2 (water quality), the BPA shall ensure that all erosion and pollution control measures in the BA are included as special provisions in the Big Creek barrier removal and reconstruction contract.

2.1 Effective erosion control measures shall be in place at all times during the contract. Construction within the project vicinity will not begin until all temporary erosion controls (e.g., sediment barriers and contaminant curtains) are in place.

2.2 All exposed areas will be replanted with a native seed mix. Erosion control planting will be completed on all areas of bare soil within 14 days of completion of construction.

2.4 Measures will be taken to prevent construction debris from falling into any aquatic habitat. Any material that falls into a stream during construction operations will be removed in a manner that has a minimum impact on the streambed and water quality.

2.5 The Contractor will develop an adequate, site-specific Spill Prevention and Countermeasure or Pollution Control Plan (PCP), and is responsible for containment and removal of any toxicants released. The Contractor will be monitored by the WDFW to ensure compliance with this PCP. The PCP shall include the following:

2.5.1 A site plan and narrative describing the methods of erosion/sediment control to be used to prevent erosion and sediment for the Contractor's operations related to disposal sites, borrow pit operations, haul roads, equipment storage sites, fueling operations, and staging areas.

2.5.2 Methods for confining and removing and disposing of excess construction materials, and measures for equipment washout facilities.

2.5.3 A spill containment and control plan that includes: Notification procedures; specific containment and clean up measures which will be available on-site; proposed methods for disposal of spilled materials; and employee training for spill containment.

2.5.4 Measures to be used to reduce and recycle hazardous and non-hazardous waste generated from the project, including the following: types of materials, estimated quantity, storage methods, and disposal methods.

2.5.5 An Erosion and Pollutant Control Manager, who shall also be responsible for the management of the Contractor's PCP.

2.6 Areas for fuel storage, refueling, and servicing of construction equipment and vehicles will be at least 150 feet from the stream channel and all machinery fueling and maintenance will occur within a contained area. Overnight storage of vehicles and equipment must also occur in designated staging areas.

2.7 Equipment refueling and storage areas will have hydrologic function restored (e.g., ripping or subsoiling) in areas where it has been degraded by equipment staging.

2.8 No surface application of nitrogen fertilizer will be used within 50 feet of any water body.

To implement RPM No. 3 (riparian and instream habitat protection), the BPA shall ensure that:

3.1 Alteration of native vegetation will be minimized. Where native vegetation will be altered, measures will be taken to ensure that roots are left intact, in order to reduce erosion while still allowing room to work. No protection will be made of invasive exotic species (e.g., Himalayan blackberry), although no chemical treatment of invasive species will be used.

3.2 Riparian vegetation removed will be replaced with a native seed mix, shrubs, and trees according to the re-vegetation plan presented in the BE.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2));

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (section 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting

the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Essential Fish Habitat consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook; coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and Action Area are detailed above in section 1.2 and 1.3 of this document. The Action Area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in section 2.2 of this document, the proposed action may result in short- and adverse effects to a variety of habitat parameters.

1. The proposed action will result in a temporary risk of contamination of waters through the accidental spill or leakage of petroleum products from heavy equipment.

2. The proposed action will result in a short-term degradation of water quality (turbidity) because of instream construction activities.

3. Temporary loss of aquatic insects (a prey base for listed fish) due to the physical loss of existing habitat at the structure placement sites and sedimentation of downstream habitat.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect designated EFH for chinook and coho salmon.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BE will be implemented by the BPA, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. To minimize the adverse effects to designated EFH for Pacific salmon (contamination of waters, suspended sediment, and habitat alteration), NOAA Fisheries recommends that the BPA implement the following:

For EFH effect No. 1, the Contractor should develop an adequate, site-specific Spill Prevention and Countermeasure or Pollution Control Plan (PCP), and is responsible for containment and removal of any toxicants released. The Contractor should be monitored by the WDFW to ensure compliance with this PCP. The PCP should include the following:

1.1 A site plan and narrative describing the methods of erosion/sediment control to be used to prevent erosion and sediment for Contractor's operations related to disposal sites, borrow pit operations, haul roads, equipment storage sites, fueling operations, and staging areas.

1.2 Methods for confining and removing and disposing of excess construction materials, and measures for equipment washout facilities.

1.3 A spill containment and control plan that includes: Notification procedures; specific containment and clean up measures which will be available on-site; proposed methods for disposal of spilled materials; and employee training for spill containment.

1.4 Measures to be used to reduce and recycle hazardous and non-hazardous waste generated from the project, including the following: Types of materials, estimated quantity, storage methods, and disposal methods.

1.5 An Erosion and Pollutant Control Manager, who should also be responsible for the management of the Contractor's PCP.

1.6 Areas for fuel storage, refueling, and servicing of construction equipment and vehicles should be at least 150 feet from the stream channel and all machinery fueling and maintenance should occur within a contained area. Overnight storage of vehicles and equipment should also occur in designated staging areas.

For EFH effect No. 2, all in-water work should be isolated by a cofferdam, or the stream routed through a pipe or culvert, to minimize the potential for sediment entrainment. Alteration or disturbance of streambanks should be minimized

For EFH effect No. 3, alteration of native vegetation should be minimized. Where native vegetation will be altered, measures should be taken to ensure that roots are left intact, in order to reduce erosion while still allowing room to work. Riparian vegetation removed should be replaced with a native seed mix, shrubs, and trees according to the re-vegetation plan presented in the BE.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(k), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The NOAA Fisheries must reinitiate EFH consultation if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

4.0 REFERENCES

Allan, J. D. 1995. Stream Ecology: structure and function of running waters. Chapman and Hall, Inc., New York.

Berg, L., and T. G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Canadian Journal of. Fisheries and Aquatic Science 42: 1410-1417.

Bishop, S., and A. Morgan, (*eds.*). 1996. Critical habitat issues by basin for natural chinook salmon stocks in the coastal and Puget Sound areas of Washington State. Northwest Indian Fisheries Commission, Olympia, WA. 105 pp.

Bisson, P. A., and R. E. Bilby. 1982. Avoidance of suspended sediment by juvenile coho salmon. North American Journal Fisheries Management 4: 371-374.

Busack, C., C. Knudsen, A. Marshall, S. Phelps and D. Seiler. 1991. Yakima Hatchery Experimental Design Annual Progress report DOE/BP-00102, Bonneville Power Administration, Div. Of Fish and Wildlife, Portland, Oregon, 226 pp.

Busby, P., T. Wainwright, G. Bryant, L. Lierheimer, R. Waples, F. Waknitz, and I. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Department of Commerce. NOAA Tech. Memo. NMFS-NWFSC-27, 261 pp.

Campton, D.E., and J.M. Johnston. 1985. Electrophoretic evidence for a genetic admixture of native and nonnative trout in the Yakima River, Washington. Trans. Am. Fish. Soc. 114: 782-793.

Chapman, D., C. Peven, T. Hillman, A. Giorgi, and F. Utter. 1994. Status of summer steelhead in the mid-Columbia River. Don Chapman Consultants, Inc. 318 pp. (Available from Don Chapman Consultants Inc. 3653 Rickenbacker, Suite 200, Boise, ID 83705)

Gregory, R. S., and T. S. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile chinook salmon (*Oncorhynchus tshawytscha*) in turbid laboratory conditions. Canadian Journal of Fisheries and Aquatic Sciences 50: 223-240.

Hilborn, R. 1992. Can fisheries agencies learn from experience? Fisheries 17: 6-14.

Hockersmith, E., J. Vella, and L. Stuehrenberg. 1995. Yakima River radio-telemetry study: steelhead, 1989-1993. Annual report submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-00276-3.

Howell, P., K. Jones, D. Scarnecchia, L. LaVoy, W. Knedra, and D. Orrmann. 1985. Stock Assessment of Columbia River Anadromous Salmonids (Project 83-335, 2 volumes), Final Report to Bonneville Power Administration, Portland, Oregon.

Lichatowich, J.A. and L.E. Mobrand. 1995. Analysis of Chinook salmon in the Columbia River from an ecosystem perspective. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon. 102 pp.

Lichatowich, J. A., L.E. Mobrand, L. Lestelle and T. Vogel. 1995. An approach to the diagnosis and treatment of depleted Pacific salmon populations in Pacific Northwest watersheds. Fisheries 20: 10-18.

Lilga, M.C. 1998. Effects of flow variation on stream temperatures in the lower Yakima river. Masters Thesis, Washington State University, Pullman, Washington. 91 pp.

McClure, M.M., E.E. Holmes, B.L. Sanderson, and C.E. Jordan, in review (2001). A standardized quantitative assessment of status in the Columbia River Basin. Ecological Applications.

National Marine Fisheries Service. 1996. Factors for decline: a supplement to the notice of determination for West Coast steelhead under the Endangered Species Act. National Marine Fisheries Service, Protected Resources Branch, Portland, Oregon.

National Marine Fisheries Service. 1998. Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California. NOAA Technical Memo NMFS-NWFSC-35. 443 pp.

National Marine Fisheries Service (NMFS). 1999. Biological opinion on artificial propagation in the Columbia River basin-incidental take of listed salmon and steelhead from Federal and non-Federal hatchery programs that collect, rear, and release unlisted fish species. NMFS, Endangered Species Act Section 7 consultation. March 29.

National Marine Fisheries Service. 2000. Biological Opinion on Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. Northwest Region, Portland, OR.

National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids (NRCC). 1996. Upstream: Salmon and Society in the Pacific Northwest. National Academy Press, Washington, DC, 452 pp.

Pacific Fishery Management Council (PFMC). 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Portland, Oregon.

Pearsons, T.N., G.A. McMichael, S.W. Martin, E.L. Bartrand, J. A. Long and S.A. Leider. 1996. Yakima species interactions studies. Annual Report FY 1994. Bonneville Power Administration DOE/BP-99852-3.

Phelps, S.R., B.M. Baker and C.A. Busack. 2000. Genetic relationships and stock structure of Yakima River basin and Klickitat River basin steelhead populations. Washington Department of Fish and Wildlife Genetics Unit unpublished report. Olympia, Washington. 56 pp.

Reisenbichler, R.R., J.D. McIntyre, M.F. Solazzi, and S.W. Landino. 1992. Genetic variation in steelhead of Oregon and northern California. Transactions of the American Fisheries Society 121:158-162.

Schreck, C.B., H.W. Li, R.C. Jhort, and C.S. Sharpe. 1986. Stock identification of Columbia River chinook salmon and steelhead trout. Final report to Bonneville Power Administration, Portland, Oregon (Project 83-451).

Servizi, J. A., and D. W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*), pp. 254-264. *In* H. D. Smith, L. Margolis, and C. C. Wood *eds.* Sockeye salmon (*Oncorhynchus nerka*) population biology and future management. Canadian Special Publications of Fisheries and Aquatic Sciences 96.

Servizi, J. A., and D. W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49: 1389-1395.

Sigler, J. W., T. C. Bjornn, and F. H. Everest. 1984. Effects of chronic turbidity on density and growth of steelhead and coho salmon. Transactions of the American Fisheries Society 113: 142-150.

Spence, B. C., G. A. Lomnicky, R. M. Hughes, and R. P. Novitzki. 1996. An ecosystem approach to salmonid conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, Oregon.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act. U.S. Government Printing Office. Washington D.C.

Vaccaro, J.J. 1986. Simulation of streamflow temperatures in the Yakima river basin, Washington, April-October 1981. U.S. Geological Survey Water Resources Investigations Report 85-4232, Tacoma, Washington.

Waples, R. S., O. W. Johnson, and R. P. Jones, Jr. 1991. Status review for Snake River sockeye salmon. National Marine Fisheries Service, Northwest Fisheries Science Center, NOAA Technical Memorandum NMFS F/NWC-195, Seattle, Washington.

Washington Department of Fisheries and Washington Department of Wildlife (WDFW). 1993. Washington State Salmon and Steelhead Stock Inventory. Appendix Three; Columbia River Stocks. Washington Department of Fisheries, Olympia, Washington.

Yakima Subbasin Summary (YSS). 2001. Prepared for the Northwest Power Planning Council, Portland, OR. Laura Berg, Editor. 376 pp.